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ABSTRACT

This paper describes a collaborative technique for teaching technical writing, a technique that is designed to give students experience with a type of writing done rarely in the classroom but employed frequently in the work world. Students, divided into two groups, work together in composing a proposal for an extensive research project or a more modest proposal for actual implementation, to be followed by a final report of the project. Writing tasks are assigned according to individual student's expertise in such fields as environmental resource management, forestry, earth sciences, mathematics, and so on. Peer evaluation of the final products forms the basis for grading. (KS)

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Work Together, Write Together:

Group Projects in Technical Writing

Paper Presented at 1977 CCCC Conference

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I am going to be talking about one particular form of collaborative writing, perhaps the most sophisticated form: that of having a group of students work together on a single report. I have used this technique in some of the technical writing classes I have taught at Penn State, and I suspect that some of you are interested in the specific application to technical writing. On the other hand, I hope that what I have to say will be of general enough interest that it will shed light on some of the advantages and some of the practical problems of using group reports in writing classes of any kind. In any event, in order for you to understand what I've done, I think it's important to know something about the motivation that led me to try projects such as these.

As our chairperson has indicated, I worked as a physicist for some years before being converted to English. I worked with an organization called The Aerospace Corporation, whose major function was "technical direction of Air Force contracts." The work of Aerospace included planning future research programs to be funded by the Air Force, writing Requests for Proposals, reviewing proposals of private contractors in competitive bidding for Air Force contracts, monitoring the work of the contractors and then reviewing

and approving the final reports on these contracts. In addition, The Aerospace Corporation did its own independent research, and wrote reports on it.

Though I was a small cog in all this work, I did get to see a lot or reports of various kinds, and participated in either writing or reviewing them. My point in all this is to impress you with the fact that a large number of reports written on technical subjects are done as joint efforts with other people. Requests for proposals, proposals, test plans, test reports, contract final reports, and even independent research reports are often written in collaboration with other workers. Such writing poses very real practical problems, the most severe of which are caused by the competing requirements of careful coordination and cooperation to make the report consistent, and the frequent necessity of working within very tight time schedules. Some proposals for large contracts are monstrous affairs in which 50 to 100 people may have had a hand, and if the deadline for submission is missed, the proposal is simply not considered. And some of the real proposals I have reviewed showed obvious signs of haste and lack of coordination.

In my own writing, of the four published research reports which I worked on, one was mine alone, and the other three were written with several other people. Certainly a lot of intra-company writing, in the form of informal reports or memos, is done independently; but I would say that in the fields of work I had experience with, a large fraction of writing, perhaps as much as 50%, is done collaboratively. Now, it's true that my experience covers only a small sector of technical and professional writing, but from my discussions with people in other fields, I find that my experience is representative.

So, in teaching technical writing to students, my initial and principal motivation was highly practical: to give students experience in a kind of writing which is rarely done in the classroom, yet which they are likely to find very frequent in their later work. In initiating these projects I was not principally thinking about collaborative writing as a way to improve style in general or even to improve teaching effectiveness, but as a way to have students address some of the problems which are peculiar to group writing projects. These problems, as I've already touched on those of organization, coordination, making one part consistent with the other in content and scope, and as much as possible, consistent in style. Though, as I say, my original intent was not the improvement of basic writing skills, I think we achieved some important dividends in areas of writing that are not specific to group projects, and I'm convinced that what I'm doing is not only practical, but pedagogically sound, perhaps in part because it is practical.

I would like now to describe in some detail what I've actually done in my classes, with comments on the benefits to be gained and on some of the practical difficulties I've run into. I hope that what I can say can be the beginning of some discussion later about possible applications of this technique outside technical writing.

Let me say now that I am not speaking from an extensive and highly codified development of this technique. I am still working at ways to improve it, both in the logistics of the technique and in ways to get the most out of student group interactions.

Basically, my idea is to have students work on projects which are, first, real--you'll see what I mean by real in a minute--second, extensive enough so

that a group of 8 to 14 people can work on each project; and third, in the ideal case, complex enough so that the different people in the class can apply some of what they've learned in their majors to the project; yet not so complex that the class cannot handle the project in the time available to it.

Our classes at Penn State are now set at a maximum of 28 students. I've been splitting the class up into 2 groups, so that we have 2 separate projects going in the class. There might be some advantages with smaller groups, but I simply couldn't keep up with more projects.

So far I've used the technique in two ways. The simplest is to work together on a common proposal for some large-scale research project or feasibility study; but we don't actually carry out the study that is proposed. This method has the advantage that the project can be fairly ambitious and complex, and provide scope for many different disciplines. It is also easy to complete only the proposal during the duration of a course. The disadvantages are that it's hard to keep the work proposed by students at a realistic level if they know that they're not going to have to do the work they've proposed--one of the tests of a good proposal is whether you can actually perform what you claim you can. Another disadvantage is that it's somewhat of a letdown for students to put so much effort into a proposal and then not see the fruits of it.

The second method I've used is to have students write a proposal for a more modest research project--write this early in the course--and then have them carry out the work and write the final report on it. The advantages of doing both a proposal and a final report are the satisfaction gained by accomplishing the goals of the project, and the fact that it tests their

honesty in writing the proposal. Students also get more practice in collaborative writing by doing 2 reports. The obvious disadvantages are that this approach carries students into work which extends well beyond what is normally part of a writing course, and that this is a lot of work to accomplish in the time allowed for a three credit course. I might mention that at Penn State we're on the term system, with 10 weeks of 75 minute classes in a term, so the time is even more compact than in a semester system. I'd like to have a chance to teach a course like this on a semester schedule.

Let me, now, get into a few practicalities on how the courses have been run. First of all, these group projects are by no means the entire content of the course. I try to cover the standard topics of a technical writing course, and I give a number of other individual assignments. So what I describe here will be only that part of the course that revolves around the group writing assignments.

The first job is to select the topics to work on. I usually have each student suggest a topic, in writing, with some comments on how it might be developed and on what skills will be needed. Then we vote on the topics and choose 2 for the class to work on, with the exception that I retain the right of a veto if a popular topic doesn't look like it will work out practically. One of the difficulties is getting two topics which will use the talents of as many people as possible in the class. I provide students, before they suggest topics, with a list of the majors of all the people in the class, and ask them to state the skills needed for their project. Here is an example of the makeup of one actual class (In this case, I've divided the class into departments as though it were an actual company):

- A Department of Environmental Resource Management, with 6 people in environmental engineering, environmental resource management, and wildlife management.
- A Life Sciences Department, with 6 people in animal science and plant science.
- A Forestry Department, with 4 people in forest science and forestry.
- An Engineering Department, with 4 people in mechanical, industrial, and architectural engineering.
- An Earth Sciences Department, with 2 people in geology and petroleum and natural gas.
- A one-man Math and Computation Department.

I might mention that the problem of finding a role for everyone can be alleviated somewhat by assigning some people, who don't quite fit in, to special duties such as working with the Introduction, Conclusion, flow charts, schedules, and so on. Incidentally, I generally ask for one senior member of the class to volunteer to act as project coordinator. One of the main duties of this person is to help run discussion groups when the class is split into two, and I can only be with one group. To give you an idea of possible topics--what I mean by real projects--here is a list of the projects which my classes have worked on so far:

We've written only proposals on these topics (that is, we haven't carried out the work proposed):

1. A Study of Solar Energy Applications to Housing in the State College Area.
2. A Feasibility Study for an Aquarium at Penn State.
3. A Feasibility Study for a Large "Technical Services" Building for the use of technical students in all disciplines at Penn State.
4. A Plan for Re-Introducing Wildlife Species that Have Disappeared from Pennsylvania.

The two projects which we carried through to completion, and wrote final reports on were

1. A Feasibility Study of Solid Waste Reclamation in the State College Area.
2. A Plan for the Reclamation of a Specific Strip Mine Area North of Altoona.

I have copies of some of these reports for you to look at after the meeting, if you wish. The report on Trash Reclamation has been edited somewhat, and typed in uniform format, to show the possibilities of improving physical appearance. The other reports are compiled of sections exactly as handed in by students. All of the reports are still far from finished products--they still suffer from unevenness of detail, errors in grammar and spelling, and so on; but I do think they represent some significant work.

Let me go back now to discussing some of the procedures followed, especially how we use our class time. I will describe the procedures followed in proposal writing, but these techniques apply, mutatis mutandis, to the final report as well. Once topics have been selected, I usually make tentative assignments of people to one group or another, and then give them a chance to trade around, if they strongly prefer the other project.

Then we have to start developing an outline, both for the tasks to be performed, and for the report to be written. We usually start with a barnstorming session, listing ideas at random on the board, and perhaps by the end of class, arrive at a tentative outline. Then I might go over this outline with the project coordinator, refine it somewhat, and have a dittoed version ready for the following class. In this class we make any necessary additional changes or refinements, and are ready to have people assigned to specific tasks.

Because of the nature of the work, the outline, and the proposal or final report, are usually somewhat modular, or arranged according to discrete tasks. I would say that the process of working together through the organization of the work helps students to a practical application of some of the principles of outlining-- a topic that I find can be very dry of itself. It also confronts students with the problem of outlining a topic of greater complexity than many have faced in their individual writing assignments.

Once the general outline is agreed on, and students are assigned to tasks, they are ready to work on a rough draft of the proposal. It would be ideal for all students in a group to have a chance to look at the entire rough draft of the proposal before the final copy is written, but in practice this has turned out to be infeasible. What I've done is asked students to coordinate their work--both in content and style, with those whose tasks bear most closely on their own. Then they each hand in a rough draft of their tasks, and I put it together and try to make sense of the whole thing. After this I spend a class, with one group, going over the proposal from beginning to end, not necessarily every word, but covering all the major items in each task, and trying to make sure that inconsistencies and areas of overlap have been ironed out. Then students prepare their final copy. This is not done in class, but on their own.

The next step is one of the most important in my approach to collaborative writing. Once the proposal has been written, it is reviewed by the other group in the class. I try to set up the proposal review process in a manner as similar as possible to the way it would be done in industry or government. The group is asked to review the proposal as though they were to decide whether or not the other company should get a contract for the work proposed. I assign 3 or 4 people to review each section, trying to assign sections according to people's technical

backgrounds. Students are asked to provide written comments on both the content and style of the sections assigned to them, and also on the proposal as a whole. I might mention that one of the practical problems of conducting a review like this is getting copies for everyone. I've tried having students do their sections on ditto stencils, but this can be costly, and some turnaround time is required. (I once forgot that not all students are familiar with ditto stencils, and didn't explain how to use them, so that several students handed in copies of beautifully done backwards-written proposal sections.) Another method is to have students make several Xerox copies of their sections for the people reviewing those individual sections. I then make one or two complete copies available in a reading room. Once the written comments are complete, we meet together as a group, and go over the other group's proposal from beginning to end. I eventually give the written comments to the authors of the sections that were reviewed.

As many of you have probably discovered, students are often much better critics than they are writers. With proposals, students often find it hard to distinguish between being specific about what they are going to do, and the process of actually doing the work and reporting on it. That is, when you tell them to be specific, they think they have to go out and complete the task that the proposal says they're going to do. In their writing, they are often either totally vague and general about what they're going to do, or (less often) they go into such detail that there's no work left to be done in the project itself. A typical reaction that I get from students at the end of a proposal review is, "Did the other group tear apart our proposal as badly as we did theirs?" In the best of all worlds it would be nice to have a group write a proposal, review the other group's proposal, and then write another proposal, or rewrite

the first one. In practice I may never be able to accomplish this. One can at least hope that if students later have to work on proposals, they will profit some from the lessons of the class. When students write both a proposal and a final report, then they do have a chance to apply some of what they have learned, but it is to a somewhat different type of writing.

So far, the discussion has been mainly about proposal writing; but in the case where I've had students complete a study and write a final report, I followed basically the same procedure. During the course of the work on the project, we have occasional meetings to coordinate the work. Then, for the final report, students prepare a rough draft of their sections, meet to coordinate the parts as well as possible, write a final version, and then have that version reviewed by the other group. Since this work comes near the end of the term, it can be difficult to carry out the review process as thoroughly as would be desirable.

I have alluded in passing to several advantages and disadvantages of this technique of teaching writing. I'd like to review some of these, and perhaps generalize on what students learn about writing.

First, I find that these projects are generally very successful as classroom techniques. Students are usually very interested. There is the motivation of working on a real project rather than on some made-up topic. There is pride at seeing a final product of significant magnitude. The projects provide variety in classroom work--there are meetings to discuss both the work of the project and problems of writing the reports. At Penn State, where I have 75 minute periods, a class where I briefly discuss some topic on technical writing and then have group meetings works well. The group meetings also give students a chance to develop important communication skills beyond those of just writing.

As for what students learn about writing in general, I would see the benefits of this system coming first from the writing itself, and then from the process of evaluating the other group's report.

First, in writing of this kind, students do think about their audience, which I think is a most important aspect not only of technical writing, but of any kind of writing. They are not just writing a term paper to show off facts, but they are communicating with someone. Then, the knowledge that the proposals and reports will be evaluated, and not just by the teacher for a grade, can lead them to try for a better quality in their writing than they might attempt otherwise.

There is also the experience, which I've mentioned, of coping with the coordination and organization of a complex subject.

Writing a section of a longer report forces them to be more aware of transitions, to think about relating what they say about their work to what went before and will come after. I think that writing a part of a longer report can also help them to be specific about the objectives and purpose of their own section.

Evaluation by peers is common to any aspect of collaborative writing. In the types of evaluations I use, there are the benefits that are specific to the type of report students are doing--for example, how a proposal needs to be more specific about the techniques to be used--and also more general benefits for their writing style. And the benefits work both ways--for those being evaluated, and for those doing the evaluation. The persons doing the evaluation see a number of different styles and approaches, some of which may be better, some worse than their own. The people being evaluated have the benefit of comments from several different points of view on their writing.

I would like to end by calling attention to some of the particular problems with using group assignments such as these, but I hope not end on a negative note. As you can imagine, the quality of writing from student to student varies considerably. This variation extends not just to the quality of writing, but also to the quality of participation in the projects. Some students do not attend meetings, so that their parts are not properly coordinated with the others. Or their sections of the report don't get done on time, so you have an incomplete report for the evaluation. Some tasks require the completion of others before they can proceed, so that timeliness and cooperation are necessary. Generally, getting the report coordinated, written, and evaluated, with copies distributed to the right people in the time allowed for it during the course requires very tight schedules--and sometimes these schedules are not met by everyone. A few people who don't contribute well can significantly mar the overall quality of the project. I'd say that in most cases in my own experience, the reports have fallen somewhat short of their potential.

But what I would like to emphasize is that most of the problems I've been talking about right now are not limited to the classroom situation. Many of the problems met in the classroom are exactly those met in the real working situation. When a report has to be written by a group, people will always vary in their ability to write, and in the quality of their participation. True, if a worker lets you down completely on a job, you can always fire him. But there will always be those who are more prompt than others, whose initiative you can depend on more than others. What I am saying, then, is that even if the problems I've alluded to here are not solved completely and effectively

in class, the students' experiences with group writing problems such as these will help equip them to better cope with the same problems when they meet them in their professional careers. I firmly believe that writing projects such as these help students improve the quality of their writing, and especially help them when they later have to write in a group, with others.